X-ray Imaging and C-XANES of Oceanic Particulate Organic Carbon: Evidence for Unaltered Cellular Components	X1A

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The structural and molecular composition of particulate organic carbon was examined using the imaging and spectral capabilities of the X1-A STXM. The oceanic carbon cycle starts with photosynthetically produced organic matter in surface waters, which, after death of the organisms, settles to the ocean floor. During this settling process, roughly 50-90% of the organic matter is remineralized to CO_2. Although much work has been done to characterize the bulk chemical changes in this particulate flux as it settles, the physical structural changes have been difficult to elucidate. Soft X-ray microscopy and C-XANES spectroscopy has applied to a series of samples collected in the Equatorial Pacific ocean at depths between 105 meters and 3450 meters. Figure 1 shows a sample from 3450 m depth that exhibits regions of both highly degraded and pristine cellular material, including identifiable cell wall structures. The different carbon types are located within a few microns of each other, and a region can be observed in the lower right side of Figure 1 where cellular wall structures convert within a distance of less than a micron to more degraded carbon. These features are located together with a matrix of calcium carbonate and silicate phytoliths. Images taken at different energies permit the identification and location of these different components within the complex sample matrix.

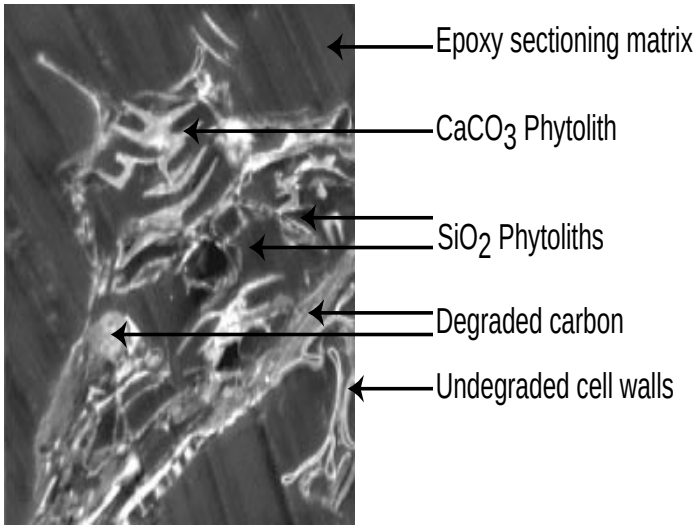

Figure 1.